Feature Extraction Technique using Discrete Wavelet Transform for Image Classification

Kamarul Hawari Ghazali, Mohd. Marzuki Mustafa, Aini Hussain
Vision & Robotics Research Group (VIROB)
Department of Electrical, Electronic and Systems Engineering
Faculty of Engineering, Universiti Kebangsaan Malaysia
43600 UKM Bangi, Malaysia.
Email: kamarul@ump.edu.my

Category: Image and Speech Processing

The purpose of feature extraction technique in image processing is to represent the image in its compact and unique form of single values or matrix vector. Low level feature extraction involves automatic extraction of features from an image without doing any processing method (1). On the other hand, high level feature extraction entails on doing processing method in computer images. The processing method could either be a statistical approach like histogram, GLCM, morphology or a structural approach which involves transformation of an image to determine the frequency component in the pixel values. In this paper, we intend to use high level feature extraction technique to investigate the characteristic of narrow and broad weed by implementing the Discrete Wavelet Transform (DWT) as the processing method. The idea of wavelet is to express the function or signals as sums of these little waves and of their translation and dilations. Wavelets are mathematical functions that cup up data into different frequency components, and then study each component with a resolution matched to its scale. One way of thinking about wavelets is to consider how our eyes look at the world. In the real world, we can observe a forest at different scale of resolution. From the bird eyes view, for example, the forest appears to be a solid canopy of green. From ground, however, the canopy resolves into individual trees, and if we see more closely, we can see branches or leaves. Most transformation techniques produce coefficient values with same size as original images. The next process to the coefficient values must be applied to represent the images with features vector. In this paper, we proposed an algorithm to implement feature extraction technique from DWT coefficient. This feature extraction was used to represent the image for classification of narrow and broad weed in automatic weeding strategy. We have tested the algorithm with 1000 sample images and found that the successful rate of classification is more than 95%.

Keywords: Feature extraction, Discrete Wavelet Transform, Coefficient, weed, resolution

References:

Mark S. Nixon, Alberto S. Aguado, Feature Extraction and Image Processing, Oxford, 2002,